

CLAIMS

What is claimed is:

1. A cooling device for removing heat from an integrated circuit, said cooling device comprising:

a conduit;

a flexible channel having a first open end and a second closed end, said first open end coupled with said conduit, said open end having an internal width, said flexible channel comprised of a resilient material having spring-like characteristics, said material to provide a spring-like restoring force when compressed; and

an interconnect mechanism between said conduit and said flexible channel to allow a gas or a fluid introduced within said conduit to move between said conduit and said flexible channel.

2. A cooling device as in Claim 1, wherein said interconnect mechanism is an opening in a surface of said conduit.

3. A cooling device as in Claim 1, wherein said opening has a width equal to said internal width of said open end.

4. A cooling device as in Claim 1, wherein said open end is coupled with said conduit by a technique selected from the group consisting of soldering, sautering, welding, and adhering.

5. A cooling device as in Claim 4, wherein said flexible channel, including said closed end, is sealed.
6. A cooling device as in Claim 1, wherein said closed end comprises a thermally conductive material attached to said resilient material, said thermally conductive material having a substantially planar exterior surface, said substantially planar exterior surface to contact said integrated circuit when said flexible channel is in an expanded state.
7. A cooling device as in Claim 6, wherein said thermally conductive material is copper.
8. A cooling device as in Claim 6, further comprising:
a thermally conductive paste applied between said substantially planar exterior surface and said integrated circuit.
9. A cooling device as in Claim 1, wherein said resilient material comprises a material selected from the group of which phosphor bronze and berillium copper are members.
10. A cooling device as in Claim 1, wherein said resilient material is pleated.
11. A cooling device as in Claim 1, wherein said flexible channel is in a compressed state.

12. A cooling device as in Claim 11, further comprising:

a vacuum pressure within said conduit and said flexible channel.

13. A cooling device as in Claim 11, wherein a pressure within said flexible channel is less than 1.0 atmosphere.

14. A cooling device as in Claim 11, wherein no fluid is within said flexible channel.

15. A cooling device as in Claim 11, wherein one of said fluid or said gas is within said flexible channel.

16. A cooling device as in Claim 1, wherein said flexible channel is in an extended state.

17. A cooling device as in Claim 16, wherein a pressure within said extended flexible channel approximately equals 1.0 atmosphere.

18. A cooling device as in Claim 16, wherein a pressure within said extended flexible channel is not a vacuum pressure.

19. A cooling device as in Claim 18, wherein one of said gas or said fluid is contained within said conduit and said flexible channel.

20. A cooling device as in Claim 19, wherein one of said gas or said fluid is heated.

21. A cooling device as in Claim 19, wherein one of said gas or said fluid is cooled.

22. A cooling device as in Claim 19, wherein said closed end contacts said integrated circuit and wherein heat from said integrated circuit is dissipated by said gas or said fluid contained within said conduit and said flexible channel.

23. A cooling device as in Claim 19, further comprising:

a plurality of flow diverters attached within said channel to create turbulence in said gas or said fluid.

24. A cooling device as in Claim 19, further comprising:

a heat sink attached to an interior surface of said closed end to cause heat absorbed by said closed end to be conducted through said heat sink to said gas or said fluid contained within said conduit and said flexible channel.

25. A cooling device as in Claim 1, wherein said flexible channel is compressed by creating a vacuum pressure within said flexible channel.

26. A cooling device as in Claim 1, wherein said flexible channel is compressed by creating a pressure of less than 1.0 atmosphere within said flexible channel.

27. A cooling device as in Claim 1, wherein said flexible channel is extended by equalizing a vacuum pressure within said flexible channel to approximately equal 1.0 atmosphere.
28. A cooling device as in Claim 1, wherein said flexible channel is extended by creating a pressure approximately equal to 1.0 atmosphere within said flexible channel.
29. A cooling device as in Claim 1, further comprising:
a heat sink attached to an interior surface of said closed end to cause heat absorbed by said closed end to be conducted through said heat sink to said gas or said fluid contained within said conduit and said flexible channel.
30. A cooling device as in Claim 29, wherein said heat sink is a thin membrane.
31. A cooling device as in Claim 29, wherein said heat sink comprises a plurality of spaced apart planar fins.
32. A cooling device as in Claim 1 wherein said conduit is a heat pipe.
33. A cooling device as in Claim 32, further comprising:
wicking material contained within said heat pipe; and
a reservoir coupled with said heat pipe, said reservoir to contain one of said gas or said fluid.

34. A cooling device as in Claim 33, wherein said fluid is contained within said heat pipe.

35. A cooling device as in Claim 33, wherein said gas is contained within said heat pipe.

36. A method for removing heat from an electronic or electrical device, said method comprising:

positioning said device proximate a conduit having a flexible channel attached thereto; and

extending said flexible channel until a closed end of said flexible channel contacts said device.

37. A method as in Claim 36, wherein said extending said flexible channel further comprises:

introducing a gas or a fluid within said conduit and said flexible channel; and

creating a pressure approximately equal to 1.0 atmosphere within said flexible channel.

38. A method as in Claim 36, wherein said extending said flexible channel further comprises:

equalizing a vacuum pressure within said flexible channel to approximately equal 1.0 atmosphere.

39. A method as in Claim 36, further comprising:

compressing said flexible channel until said closed end no longer contacts said device.

40. A method as in Claim 39, wherein said compressing said flexible channel further comprises:

creating a vacuum pressure within said flexible channel.

41. A method as in Claim 39, wherein said compressing said flexible channel further comprises:

creating a pressure within said flexible channel of less than 1.0 atmosphere.

42. A cooling device for removing heat from an electronic or electrical device, said cooling device comprising:

means for positioning said device proximate a conduit having a flexible channel attached thereto; and

means for extending said flexible channel until a closed end of said flexible channel contacts said device.

43. A cooling device as in Claim 42, wherein said means for extending said flexible channel further comprises:

means for introducing a gas or a fluid within said conduit and said flexible channel; and

means for creating a pressure within said flexible channel of approximately 1.0 atmosphere.

44. A method as in Claim 42, further comprising:

means for compressing said flexible channel until said closed end no longer contacts said device.

45. A cooling device as in claim 44, wherein said means for compressing said flexible channel further comprises:

means for creating a vacuum pressure within said flexible channel.

46. A cooling device as in Claim 44, wherein said means for compressing said flexible channel further comprises:

means for creating a pressure of less than 1.0 atmosphere within said flexible channel.